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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/629,096	07/28/2003	Joon-Sang Yu	5000-1-419	6361
33942	7590	10/14/2005	EXAMINER	
CHA & REITER, LLC 210 ROUTE 4 EAST STE 103 PARAMUS, NJ 07652			VAN ROY, TOD THOMAS	
			ART UNIT	PAPER NUMBER
			2828	
DATE MAILED: 10/14/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/629,096	Applicant(s) YU, JOON-SANG	
	Examiner <i>W. J. Roy</i> Tod T. Van Roy	Art Unit 2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 04 August 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 10-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8, 10 and 12-16 is/are rejected.
- 7) ☒ Claim(s) 11 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Response to Amendment

The examiner acknowledges the cancellation of claim 9, and addition of claims 11-16.

Response to Arguments

Applicant's arguments filed 08/04/2005 have been fully considered but they are not persuasive.

With respect to claims 1 and 6, the applicant has stated on page 8 of the Remarks that Okamoto's waveguide (#12) is not stepped.

The examiner feels the waveguide as disclosed by Okamoto can indeed be considered stepped. The waveguide extending from the DFB laser portion is straight, and then encounters a split, which then allows the light to either step up, or step down from the original path direction. The applicant has stated that the guide is not stepped, but has not given any kind of description or argument as to why this is the case. The examiner therefor believes that the original description of Okamoto's waveguide as being stepped would be reasonable to one of ordinary skill in the art.

With respect to claims 2-3 and 7-8, the applicant has stated on page 8 of the Remarks that the stated improvement to Okamoto's laser apparatus would not have been obvious, as it would degrade the precision in forming the grating.

The examiner believes that Okamoto merely teaches that diffraction grating can be formed with high precision, but does not teach away from the grating being moved to a different position in the device. For example, Okamoto does not state that moving the grating to another position would degrade, or improve, device performance, only that using the fabrication method as stated yields a high precision grating. As Okamoto does not appear to teach away from the grating change, as suggested by the applicant, it is believed that the change would be reasonable to one of ordinary skill in the art.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 4-5, 6, 12-13, and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Okamoto et al. (US 5787105).

With respect to claims 1 and 13, Okamoto discloses a distributed feedback laser (col.8 lines 23-28) comprising a guide layer including a plurality of waveguides coupled in a multi-branch structure (fig. 5 #12) stepped to form a light path (#12 - waveguide

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extending from the DFB laser portion is straight, and then encounters a split, which then allows the light to either step up, or step down from the original path direction), the guide layer used as a transmission medium for light having a predetermined wavelength (col.9 lines 14-18), and formed on the guide layer (fig.6b #22-25), an active layer (fig. 6b #26) for oscillating light (col.8 lines 63-67), said structure being configured to split, in favor of a branch leading away from said path (fig.5 #12, bottom of Y split, which leads away from the original straight light path), a power of light proceeding along said path so that a branch other than the favored branch follows a next step in said structure (fig.5 #12, top of Y split, higher step).

With respect to claim 4, Okamoto discloses a distributed feedback laser further comprising a semiconductor substrate (fig.6b #21), a lower clad layer interposed between the semiconductor substrate and the guide layer (col.5 line 18) and an upper clad layer on the active layer and the lower clad layer (fig.6d #29) so as to surround the guide layer.

With respect to claim 5, Okamoto discloses a distributed feedback laser as in the rejection to claim 4 above, further comprising a upper electrode formed on the upper clad layer (fig.5 #701) and a lower electrode formed under the semiconductor substrate (col.7 lines 5-9, disclosing the bottom electrode although not as a preferred embodiment, note that non-preferred embodiments constitute prior art MPEP 2123).

With respect to claim 6, Okamoto discloses a distributed feedback laser (col.8 lines 23-28) comprising a guide layer having a plurality of waveguides (fig.5 #12, multi-branches = plurality of guides) coupled in a stepped branch structure (#12 - waveguide

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extending from the DFB laser portion is straight, and then encounters a split, which then allows the light to either step up, or step down from the original path direction), wherein light is transmitted having a predetermined wavelength (col.9 lines 14-18), and formed on the guide layer (fig.6b #22-25), an active layer (fig. 6b #26) for oscillating light (col.8 lines 63-67), said structure being configured such that light is repeatedly branched (light repeatedly branched at intersection of branched waveguide #12, from straight portion to lower and upper portions) so that diverted light proceeds from one step to a next (from straight original guide, to either upper or lower steps) in said structure.

With respect to claim 12, Okamoto further discloses the said structure is further configured to repeatedly perform the splitting (light repeatedly split – once at intersection of branched waveguide #12, from straight portion to lower, and another split from straight portion to the upper portion) wherein a branch other than that favored (favored = lower branch, not favored = upper) forms a next step in said structure.

With respect to claim 15, Okamoto further discloses that proceeding from one step to a next is step-wise upward in said structure (fig.5 #12, step proceeding from straight portion to the upper portion of Y split).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 2, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okamoto in view of Huang (US PG PUB 2002/0037024).

With respect to claim 2, Okamoto teaches the distributed feedback laser as described in the rejection to claim 1 above wherein the grating of a predetermined period (col.8 lines 63-67, describing the grating's feedback function as in a DFB laser where the small wavelength fluctuation is due to a selected grating period), Okamoto does not teach the grating to be formed under the guide layer. Huang teaches a distributed feedback laser wherein the grating (fig.2 #103) is formed under the guide layer (fig.2 #110, [0034] line 7). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the distributed feedback laser of Okamoto with the grating location of Huang in order to enhance coupling of light to the guide by placing the waveguide in-between the grating and active region.

With respect to claim 7, Okamoto teaches the distributed feedback laser as described in the rejection to claim 6 above wherein the grating of a predetermined period (col.8 lines 63-67, describing the grating's feedback function as in a DFB laser where the small wavelength fluctuation is due to a selected grating period), Okamoto

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does not teach the grating to be formed under the guide layer. Huang teaches a distributed feedback laser wherein the grating (fig.2 #103) is formed under the guide layer (fig.2 #110, [0034] line 7). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the distributed feedback laser of Okamoto with the grating location of Huang in order to enhance coupling of light to the guide by placing the waveguide in-between the grating and active region.

Claims 3, 8, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okamoto in view of Huang and further in view of Tohyama (US 5642371).

With respect to claims 3 and 8, Okamoto and Huang teach the DFB device outlined in the rejection to claims 2 and 7 above, including adapting the waveguides for phase modulation (col.11 lines 22-25), but do not teach the grating to be formed under a topmost step in said structure. Tohyama teaches a waveguide (fig.15 #56) with a grating device wherein the grating is used to phase modulate the optical signal (col.15 lines 26-28). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teaching of a phase modulation in the waveguides of Okamoto with the phase modulating gratings of Tohyama, applicable to any guide (upper, lower, or otherwise), in order to adapt the output phase of the light to fit the intended application.

With respect to claim 16, Okamoto, Huang, and Tohyama teach the DFB device, and Tohyama further teaches an upper electrode formed above and along said waveguide and grating (fig.15 #43a, applicable to any guide, upper, lower, or

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otherwise). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the phase grating placement of Okamoto, Huang, and Tohyama with the electrode of Tohyama in order to change the refractive index and obtain further control over the phase of the output light (Tohyama, col.16 lines 9-11).

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okamoto in view of Findakly (US 4515428).

With respect to claim 14, Okamoto teaches the DFB device as outlined in the rejection to claim 1, but does not teach the light to be branched due to a predetermined uneven ratio. Findakly teaches a multi-branching waveguide structure wherein it is taught that varying power levels can be branched into each guide (abs.). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the DFB device of Okamoto with the splitting ratio options of Findakly (taught to be for any degree, uneven or otherwise) in order to output different power levels to different receiving elements to fit the desired application.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okamoto in view of Findakly, and further in view of Huang.

With respect to claim 10, Okamoto teaches the distributed feedback laser as described in the rejection to claim 1 above, including a grating having a predetermined period (Okamoto, col.8 lines 63-67, describing the grating's feedback function as in a

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DFB laser where the small wavelength fluctuation is due to a selected grating period), Okamoto does not teach the grating to be formed under the guide layer or the guide to be of a hierarchal Y-structure. Findakly teaches the use of a multi-branching or hierarchal Y-structure for waveguides (fig.1). Huang teaches a distributed feedback laser wherein the grating (fig.2 #103) is formed under the guide layer (fig.2 #110, [0034] line 7). It would have been obvious to one of ordinary skill at the time of the invention to combine the distributed feedback laser of Okamoto with the waveguide structure of Findakly to allow for multiple outputs and for incorporation into optical networks (Findakly, col.1 lines 5-16), as well as to combine the distributed feedback laser of Okamoto and Findakly with the grating location of Huang in order to enhance coupling of light to the guide by placing the waveguide in-between the grating and active region.

Allowable Subject Matter

Claim 11 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 11 is believed to be allowable based on the fact that a distributed feedback laser comprising a lower and higher waveguide coupled in a hierarchal Y structure, wherein guided light is subject to loss according to a predetermined ratio, wherein a grating is formed under the guide layer having a predetermined period, and an end of

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the laser is configured to losslessly output light from the highest of the waveguides in the hierarchy, was not found to be taught in the prior art.

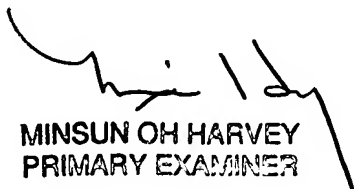
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tod T. Van Roy whose telephone number is (571)272-8447. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on (571)272-1835. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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